

LANDFILL GAS CAPTURE

A Guideline on the Regulatory and Approval Requirements
for Landfill Gas Capture Facilities

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Ministry of the Environment

Protecting our environment.



PREFACE

Ontario Regulation 232/98 (“O. Reg. 232/98”) and Revised Regulations of Ontario 1990, Regulation 347 (General – Waste Management) (“Regulation 347”) under the *Environmental Protection Act* (EPA) were amended in June 2008 and resulted in requirements for landfill gas collection and flaring (burning), or use, for new, expanding and operating landfills larger than 1.5 million cubic metres.

This Guideline describes the regulatory and approval requirements for the capture of landfill gas and the information needed to obtain approval of the landfill gas facilities under Part V (waste management) and Section 9 (air and noise emissions) of the EPA.

Section 15 of O. Reg. 232/98 sets out the regulatory requirements for new or expanding landfill sites. Sections 11.1, 11.2, 11.3 and 11.5 of Regulation 347 set out the regulatory requirements for operating landfills. Reporting requirements for greenhouse gas reductions for new, expanding and operating sites are set out in Section 11.4 of Regulation 347.

The requirements set out in the regulations are developed through the approvals process and implemented through a Part V certificate of approval (or provisional certificate of approval).

Provisions have also been included in Regulation 347 concerning any operating landfills that have taken voluntary early action to capture landfill gas that give them an additional 7 years (until June 30, 2016) before these systems need to be assessed for improvements, if any, prior to implementation by means of a Part V certificate of approval.

The regulations do not apply to closed landfills, landfills associated with forest products operations or coal ash landfills. The regulations also provide for submission of a report, if appropriate, showing that a landfill does not generate gas of significant concern and that landfill gas facilities may not be needed.

The description of the regulatory requirements in this Guideline is given for convenience only. Reference should be made to the current relevant legislation and regulations to determine the exact requirements.

This Guideline may be amended from time to time.

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1.0 INTRODUCTION

The decomposition of the organic component of municipal waste in landfills produces landfill gas containing about 50% methane (CH_4) and 50% carbon dioxide (CO_2). Methane is a potent greenhouse gas as it has a global warming potential 21 times that of carbon dioxide. As a result landfills are considered a significant source of greenhouse gas emissions.

Landfill gas also contains trace amounts of other compounds, such as hydrogen sulphide, mercaptans and non-methane organics. These other compounds may cause odours or affect local air quality.

Landfill gas emissions can be controlled by installing a network of collection wells and directing the gas by fans to facilities for use of the gas (e.g. for electricity generation or use by a nearby industry), or for flaring (i.e. burning). Simply burning the methane to convert it to carbon dioxide reduces its global warming potential by about 95%. Use of the methane for energy purposes can further reduce greenhouse gas emissions by replacing other energy sources, such as natural gas or coal.

New Landfill Gas Regulations

O. Reg. 232/98 and Regulation 347 under the EPA were amended in June 2008 and resulted in requirements for landfill gas collection and flaring (burning), or use, for new, expanding and operating landfills larger than 1.5 million cubic metres.

The new regulations amend the existing requirements for control of the atmospheric emissions of landfill gas in Section 15 of O. Regulation 232/98 (in place since 1998) primarily by:

1. changing the landfill size trigger to 1.5 million cubic metres; and,
2. applying the requirements to operating sites, in addition to new or expanding landfills.

Section 15 of O. Reg. 232/98 (as amended) sets out the requirements for new or expanding landfills. Sections 11.1, 11.2, 11.3 and 11.5 of Regulation 347 (as added) set out the requirements for operating landfills. Reporting requirements for greenhouse gas reductions for new, expanding and operating sites are set out in Section 11.4 of Regulation 347.

For an operating site, landfill owners must submit design reports by June 30, 2009 with facilities in completed or interim completed site areas to be installed and operating by December 31, 2010. For a new or expanding site, gas facilities would be installed following site approval, in accordance with the conditions specified in the Part V EPA certificate of approval for the site.

Provisions have also been included in Regulation 347 concerning operating landfills that have taken voluntary early action to capture landfill gas that give them an additional 7 years (until June 30, 2016) before these systems need to be assessed for improvements. Any improvements would then be implemented by means of a Part V certificate of approval.

The regulations do not apply to closed landfills, landfills associated with forest products operations or coal ash landfills. The regulations also provide for submission of a report, if appropriate, showing that a landfill does not generate gas of significant concern and that landfill gas facilities may not be needed.

This Guideline

This Guideline describes the regulatory and approval requirements for the capture of landfill gas, and the information needed to obtain approval for landfill gas facilities under Part V (waste management) and Section 9 (air and noise) of the EPA. The type of information needed to show, if appropriate, that landfill gas capture may not be necessary is also described.

A sample application package for approval of landfill gas collection and control facilities under Part V and Section 9 of the EPA is available on the Ministry website (see Section 3.4 of this Guideline).

2.0 REGULATORY AND APPROVAL REQUIREMENTS

Amendments to O. Reg. 232/98 and Regulation 347 under the EPA result in requirements for landfill gas collection and flaring (i.e. burning), or use, for new, expanding and operating landfills larger than 1.5 million cubic metres.

This section of the Guideline describes the regulatory and approval requirements that apply for new or expanding landfills and operating landfills, including any operating sites that have taken voluntary early action to capture landfill gas. This section also describes the regulatory requirements for reporting landfill greenhouse (methane) gas reductions and the provisions for the submission of a report to show that gas facilities may not be needed.

The description of the regulatory requirements in this Guideline is given for convenience only. Reference should be made to the current relevant legislation and regulations to determine the exact requirements.

2.1 New or Expanding Landfills

O. Reg. 232/98 under the EPA results in requirements for landfill gas collection and flaring (burning), or use, for new or expanding landfills larger than 1.5 million cubic metres. In the case of an expanding landfill, the 1.5 million cubic metres refers to the

total of the existing and proposed new volumes. The required report on the design (and operation, maintenance and monitoring) of the landfill gas facilities would be included in the review and approval of the landfill.

Submission of a Design Report

Subsection 15(1) of O. Reg. 232/98 requires the preparation of a report on the design (and operation, maintenance and monitoring) of landfill gas facilities for new or expanding landfills. The design report would be submitted as part of the overall application for approval of the proposed new or expanding site under Part V (waste management) of the EPA.

Approval and Implementation

Approval and implementation of the landfill gas facilities for new or expanding landfills would be dealt with in the certificates of approval issued for the site under Part V (waste management) and Section 9 (air and noise) of the EPA.

The overall application for approval of a proposed new or expanding landfill under Part V of the EPA should identify the requirement to capture landfill gas and should include the conceptual design of the landfill gas system for the entire site. Detailed design of the gas system and its implementation would be undertaken in phases, as outlined in the conceptual design, and as set out in conditions specified in the Part V certificate of approval. In the case of a site expansion, the detailed design and implementation of the gas facilities for the existing area of the site should be submitted early, following overall approval of the site expansion.

Section 9 Air & Noise Approval

Approval under Section 9 of the EPA would be dealt with at the time of detailed design in conjunction with the conditions pertaining to detailed design in the Part V certificate of approval.

2.2 Operating Landfills

Regulation 347 under the EPA requires landfill gas collection and flaring (burning), or use, for operating landfills larger than 1.5 million cubic metres. Regulation 347 also requires implementation of specific landfill gas facilities by December 31, 2010. The certificate(s) of approval for the landfill sites would be amended to include the landfill gas facilities as approved by the approval Director.

Provisions have also been included in Regulation 347, however, concerning any operating landfills that have taken voluntary early action to capture landfill gas that give them an additional 7 years (until June 30, 2016) before these systems need to be assessed for improvements. Refer to Subsection 2.2.1 of this Guideline.

June 30, 2009 Design Report

Section 11.1 of Regulation 347 applies to operating landfills that have not taken voluntary early action to capture landfill gas.

Section 11.1 does not apply to an operating landfill that has taken voluntary early action to capture landfill gas, and has requested that Section 11.1 not apply, or to a landfill that has previously been required to submit a landfill gas design report pursuant to Subsection 15(1) of O. Reg. 232/98 (i.e. for purposes of approval of the site as a new or expanding landfill). Refer to Subsection 2.2.1 of this Guideline for the requirements that apply to operating landfills that have taken voluntary early action to capture landfill gas.

Subsection 11.1(1) of Regulation 347 requires submission of a report on the design (and any possible improvements) of landfill gas facilities for operating landfills by June 30, 2009.

The design report must take into account the requirements in Section 11.3 of Regulation 347 that landfill gas facilities in completed or interim completed areas of an operating site must be in place and operating by December 31, 2010. A completed or interim completed area is a portion of the site which has reached maximum capacity or has been partially filled but has not received waste during the preceding 6 months (as of, or after, December 31, 2010).

Approval and Implementation

Approval and implementation of the landfill gas facilities would be dealt with through amendments to the certificates of approval issued for the landfill site under Part V and Section 9 of the EPA.

The June 30, 2009 design report required by Subsection 11.1(1) of Regulation 347 should identify the requirement to capture landfill gas and should include the conceptual design of the landfill gas system for the entire site and, at a minimum, the detailed design of the portion of the gas system required to be approved by the Director and be in place and operating by December 31, 2010. Detailed design and implementation of the facilities for the remaining portion of the site would be undertaken in phases, as outlined in the conceptual design, and as set out in conditions in the Part V certificate of approval.

Section 9 Air & Noise Approval

Approval of the landfill gas system under Section 9 of the EPA would be dealt with at the time of detailed design in conjunction with the conditions pertaining to detailed design in the Part V certificate of approval. The detailed design of the facilities for purposes of Section 9 approval should include the facilities required, at a minimum, to be in place and operating in completed and interim completed areas of the site by December 31, 2010 should be included in the June 30, 2009 design report. Detailed design and

implementation of the facilities for the remaining portion of the site would be dealt with in conjunction with the conditions pertaining to detailed design in the Part V certificate of approval.

2.2.1 Sites That Have Taken Voluntary Early Action

Section 11.1 of Regulation 347 (refer to Section 2.2. of this Guideline) does not apply to operating landfills that have taken voluntary early action to capture landfill gas and have requested that Section 11.1 not apply. For these voluntary early action sites, Section 11.2 of Regulation 347 applies.

Section 11.2 includes provisions that give operating landfill sites that have taken voluntary early action seven years (i.e. to June 30, 2016) before the gas systems operating in the voluntary early action areas of an operating site need to be assessed for possible improvements. After the seven year period, the improvements, if any, would need to be implemented and the facilities operated in accordance with amendments made to the Part V and Section 9 certificates of approval.

Criteria Defining Voluntary Early Action

The criteria defining a landfill site that has taken voluntary early action are set out in Subsection 11.1(6) of Regulation 347 and include the following:

- the site has a Part V certificate of approval permitting but not requiring, operation of landfill gas facilities,
- the site is operating the voluntary facilities, and
- the owner or operator of the landfill indicates they wish to use Subsection 11.1(6) and requests that Section 11.1 not apply.

The voluntary facilities would have to be approved and in operation by June 30, 2009, the date for submission of design reports under Subsection 11.1(1) and Subsection 11.2(1) of Regulation 347.

June 30, 2009 Design Report

Subsection 11.2(1) of Regulation 347 requires an operating site where voluntary early action has been taken to submit a report by June 30, 2009 that includes the following:

1. Voluntary Early Action Areas:

The report is to describe the existing gas capture facilities in areas of the site where voluntary early action has been taken to capture landfill gas and to identify that area where these facilities are located (clauses (a) and (b) of Subsection 11.2(1)).

This provision requires information identifying the location of and describing the existing facilities in the voluntary early action areas of the site. For these areas, the regulation does not require an assessment of or result in implementation of possible improvements to the voluntary gas system.

This provision essentially gives operating landfill sites that have taken voluntary early action seven years (i.e. to June 30, 2016) before the gas systems operating in the voluntary early action areas of an operating site need to be assessed for possible improvements.

2. Areas Other than Voluntary Early Action Areas:

The report is to include the design (and operation, maintenance and monitoring) and possible improvements of landfill gas capture facilities for areas of the site other than the voluntary early action areas (clauses (c) and (d) of Subsection 11.2(1)).

This provision requires information on the assessment and possible improvement of landfill gas facilities in areas of the site other than the voluntary early action areas. The design report must take into account the requirements in Section 11.3 of Regulation 347 that landfill gas facilities in completed or interim completed areas of an operating site (other than voluntary early action areas) must be in place and operating by December 31, 2010.

These requirements are similar to those in Section 11.1 that apply to operating landfills that have not taken voluntary early action (refer to Section 2.2 of this Guideline).

June 30, 2016 Design Report

Subsection 11.2(2) of Regulation 347 requires submission of a report on the design (and operation, maintenance and monitoring) and any possible improvements of landfill gas facilities for the entire operating site, including the voluntary early action areas, by June 30, 2016. All landfills that submitted a report under Subsection 11.2(1) must submit this second report under Subsection 11.2(2).

This requirement essentially ends the seven year period given to sites that have taken voluntary early action before the gas systems operating in the voluntary early action areas of those sites need to be assessed for possible improvements and for those improvements, if any, to be implemented by means of a Part V certificate of approval.

For the areas of the landfill in which voluntary earlier action has not been taken, the June 30, 2016 report would essentially be an update of the June 30, 2009 report.

Approval and Implementation

Approval and implementation of the landfill gas facilities would be dealt with through amendments to the certificates of approval issued for the landfill site under Part V and Section 9 of the EPA.

1. Voluntary Early Action Areas:

For the voluntary early action areas of the landfill, the June 30, 2009 report is limited to identifying and describing the existing gas capture facilities in areas of the site where voluntary early action has been taken to capture landfill gas. To qualify as voluntary early action facilities, approval under Part V and Section 9 of the EPA would have already had to have been obtained for these facilities. Amendments to the Part V or Section 9 certificates of approval should not be needed unless the landfill owner wishes to amend the design of the voluntary system (limited to the existing defined area for this system).

As a result of the June 30, 2016 report, approval and implementation of any improvements to the voluntary facilities and the requirement for operation of these facilities would be dealt with through amendments to the certificates of approval issued for the landfill site.

2. Areas Other than Voluntary Early Action Areas:

Approval and details of implementation of the landfill gas facilities in areas of the site other than voluntary early action areas based on the June 30, 2009 report would be dealt with in a similar manner as for landfill sites that have not taken voluntary early action (refer to Section 2.2 of this Guideline).

The June 30, 2009 design report submitted for approval should identify the requirement to capture landfill gas in areas of the site other than voluntary early action areas. The report should include the conceptual design of the landfill gas system for the entire site (other than the voluntary early action areas if they are described separately) and, at a minimum, the detailed design of the portion of the gas system required to be approved by the Director and be in place and operating by December 31, 2010. Detailed design and implementation of the facilities for the remaining portion of the site (other than the voluntary early action areas) would be undertaken in phases, as outlined in the conceptual design, and as set out in conditions in the Part V certificate of approval.

Any further improvements based on the June 30, 2016 report, which is essentially an update of the June 30, 2009 report, would be dealt with through amendments to the certificates of approval issued for the site.

Section 9 Air & Noise Approval

The landfill gas facilities in the voluntary early action areas of a landfill would already have obtained a Section 9 certificate of approval for those facilities to be operating as voluntary early action facilities.

In areas of the site other than the voluntary early action areas, approval of the gas system under Section 9 would already have been dealt with in response to the submission of the June 30, 2009 design report. The detailed design of the facilities required, at a minimum, to be in place and operating in completed and interim completed areas of the site by December 31, 2010 should have been included in the June 30, 2009 design report. Detailed design and implementation of the facilities for the remaining portion of the site (other than the voluntary early action areas) would be dealt with in conjunction with the conditions pertaining to detailed design in the Part V certificate of approval.

Approval under Section 9 of the EPA for the detailed design of any facilities or improvements needed as a result of the June 30, 2016 design report would generally be dealt with in conjunction with the conditions pertaining to detailed design in the Part V certificate of approval. For the (former) voluntary early action areas of the site, the June 30, 2016 design report should include the detailed design and implementation of any facilities or improvements needed for those areas.

2.3 Greenhouse Gas Reporting Requirements

Section 11.4 of Regulation 347 requires landfills larger than 1.5 million cubic metres that are operating on or after June 30, 2009 to report annually on the greenhouse gas reductions being achieved by the landfill. Reporting is to begin with the reductions occurring as of June 30, 2009.

The annual greenhouse gas report required by Regulation 347 is to be submitted to the Director of the Environmental Monitoring and Reporting Branch of the Ministry of the Environment by June 1 of the year following the reporting year. The report for 2009 is to include information only for the period from June 30, 2009 to December 31, 2009.

The report is to include the following information:

1. A statement of the total landfill gas volume collected by the facilities at the site during the year.
2. A statement of the percentage of the volume described in paragraph 1 that was methane gas.
3. A statement of the reductions in landfill gas emissions associated with the burning or use of landfill gas during the year, expressed in units of tonnes of carbon dioxide equivalent and based on a global warming potential of 21 for methane gas.

4. A description of how sound scientific or engineering principles have been used to support the statements required by paragraphs 1, 2 and 3.
5. All calculations and information that support the statements required by paragraphs 1, 2 and 3.

The first report is to be submitted by June 1, 2010 and cover the reporting period of June 30, 2009 to December 31, 2009. If no landfill gas is collected during the first reporting period (i.e. to December 31, 2009) the report is still required and should respond to the reporting requirements as appropriate (e.g. no landfill gas was collected during the year, etc.).

Subsequent annual reports would include the entire reporting year (i.e. January 1 to December 31). The annual reports would continue to be submitted until the Part V, EPA Director amends the Part V certificate of approval to indicate that reporting is no longer necessary as the nature and quantity of landfill gas generated by the site is not a significant concern.

2.4 No Significant Landfill Gas

The regulations provide for submission of a report, if appropriate, to show that landfill gas facilities may not be needed for a site. This provision has been included in O. Reg. 232/98 for new or expanding sites since 1998 and has been included in Regulation 347 for operating landfills.

Under Subsection 15(3) of O. Reg. 232/98 and Subsection 11.1(5) of Regulation 347, a landfill owner may submit a report to the Part V, EPA Director showing that the nature and quantity of landfill gas generated at a site is not likely to be of significant concern. The factors to be considered in this assessment are the characteristics of the site, the type of waste to be deposited and the rate at which waste is deposited at the site.

The Part V, EPA Director would review the report, and if acceptable, determine if landfill gas generated at a site is likely of significant concern and whether gas facilities are required.

If the Director determines that landfill gas generated at a site is not likely to be of significant concern, the regulatory requirements for landfill gas collection and flaring, or use, and for reporting of greenhouse gas reductions do not apply.

3.0 APPROVAL GUIDELINES

The amendments to O. Reg. 232/98 and Regulation 347 under the EPA result in requirements for landfill gas collection and flaring (burning), or use, for new, expanding and operating landfills larger than 1.5 million cubic metres.

This section of the Guideline describes the information needed to obtain approval of landfill gas facilities under Part V (waste management) and Section 9 (air and noise) of the EPA. This section also describes the type of information needed to show, if appropriate, that a landfill does not generate gas of significant concern and that landfill gas facilities may not be needed.

A sample application package for approval of landfill gas collection and control facilities under Part V and Section 9 of the EPA is available on the Ministry website (see Section 3.4 of this Guideline).

3.1 Landfill Gas Facilities Are Required

The objective of the landfill gas collection and control facilities is to achieve a maximum practical level of landfill gas collection and greenhouse (methane) gas reductions for the landfill. The landfill gas facilities will also reduce emissions of trace amounts of other compounds such as hydrogen sulphide, mercaptans and non-methane organics. These other compounds may cause odours or affect local air quality.

Where landfill gas facilities already exist at a landfill, the facilities must be assessed to determine if they achieve the objective of maximum practical landfill gas collection and greenhouse (methane) gas reduction. Any improvements to the facilities would then be made. (Refer to Subsection 2.2.1 of this Guideline for the regulatory requirements that apply to operating landfills that have taken voluntary early action to capture landfill gas.)

For a proposed landfill expansion, landfill gas facilities are required for the existing approved waste fill zone of the site in addition to the proposed new waste fill zone of the site.

The design guidelines below describe the information needed to obtain approval of landfill gas facilities under Part V (waste management) of the EPA. The additional information needed to obtain approval under Section 9 (air and noise) of the EPA is described in Subsection 3.1.1 of this Guideline.

Design Guidelines

When designing the landfill gas system for a landfilling site, a number of factors related to the overall site design and operation should be considered. These factors may affect the type and layout of the gas collection system (e.g. horizontal trenches or vertical collection wells), the rate and quantity of gas generated, and the timing of system installation and operation. These factors include:

- the presence of low permeability soil or a bottom liner system preventing lateral migration of landfill gas;
- leachate levels within the landfill;

- site configuration (e.g. landfill slopes, vertical configuration relative to surrounding ground surface, and landfill surface area relative to volume of waste);
- final cover characteristics and limitations (e.g. for groundwater protection and site end use) affecting moisture within the site and potential air intrusion;
- phasing of landfilling and closure operations for each area of the site;
- the type and procedures for daily or intermediate cover affecting hydraulic and landfill gas movement within the landfill;
- any activities to control or alter the moisture content within the landfill, such as leachate recirculation; and
- the type of waste deposited.

Taking these factors into consideration, the plans, specifications and descriptions for the design of the landfill gas collection and control system should include the following:

1. Plans, specifications and descriptions of the design of the landfill gas collection system, including:
 - a. spatial design of the collection system including collector orientation (i.e. vertical wells or horizontal trenches), layout and spacing, depth(s) of placement within the landfill and radius of capture zone;
 - b. design of the collection pipes including size, material, perforations, granular bedding/envelope, and provisions for stress relief and settlement;
 - c. design of header and transmission pipes including size, material, slope, valving, access chambers, condensate control, seepage protection, protection from freezing, bedding and provisions for stress relief and settlement; and
 - d. condensate drainage, storage and disposal.
2. Plans, specifications and descriptions of the design of the facilities for landfill gas burning, treatment or utilization, including:
 - a. a description of the landfill gas extraction equipment (i.e. blower) and the design of any moisture removal and gas treatment system;
 - b. the design, performance characteristics and operational controls for any flare system including:
 - i. the type and design of the flare device;
 - ii. design combustion temperature and residence time;
 - iii. the destruction efficiency of volatile organic compounds;
 - iv. operational control systems such as temperature and combustion air control, flame failure detection, automatic ignition system and flame arrester; and
 - c. a description of any utilization system for collected landfill gas.
3. Plans, specifications and descriptions of the operation, monitoring and maintenance procedures for the landfill gas system, including:
 - a. phasing/timing of system installation, start up and operation -- particularly with respect to integration with overall landfill operation and maximizing landfill gas control;

- b. inspection frequencies and maintenance/replacement procedures for system equipment;
- c. monitoring of landfill gas flow rates and concentrations; and
- d. contingency provisions in the event of unexpected component failures.

Please also see the Ministry's Guideline to Applying for Approval of Waste Disposal Sites for more information at: www.ene.gov.on.ca/envision/gp/4183e.pdf.

3.1.1 Section 9 Air & Noise Approval

In addition to obtaining waste management approval for the landfill gas facilities under Part V of the EPA, approval for the discharge to the atmosphere from the facilities is required under Section 9 of the EPA.

The design guidelines below describe the information needed to obtain approval under Section 9, EPA for the air emissions from landfill gas facilities. This information is in addition to the Part V, EPA information requirements described in Section 3.1 of this Guideline.

The plans, specifications and descriptions for the design of the landfill gas collection and control system should include the following:

- An Emission Summary and Dispersion Modelling Report prepared in accordance with Ontario Regulation 419/05;
- Calculations demonstrating that any landfill gas collection and flaring (burning) systems meet appropriate greenhouse gas destruction efficiencies (i.e. Maximum Achievable Control Technology); and
- Noise Screening or Acoustic Assessment Report demonstrating that the proposed landfill gas collection and flaring systems are capable of operating in compliance with the ministry noise guideline limits.

Please also see the Guideline to Applying for Approval (Air & Noise) for more information at: www.ene.gov.on.ca/envision/gp/4174e.pdf.

3.2 Existing Landfill Gas Facilities May Be Sufficient

Operating landfills that already have gas facilities in place are required to submit a report on these facilities to the Part V, EPA Director demonstrating if their existing (and future planned) facilities are sufficient. If the existing facilities are not sufficient, the operating landfill is required to include plans for improvement of the facilities. (Refer to Subsection 2.2.1 of this Guideline for the regulatory provisions included in Regulation 347 concerning operating landfills that have taken voluntary early action to capture landfill gas).

Sufficiency would be determined based on the objective of the gas facilities to achieve a maximum practical level of landfill gas collection and greenhouse gas (i.e. methane) reductions for the landfill, from the perspective of the area in which waste has been deposited and the time period of landfill gas generation.

The Part V, EPA design guidelines given in Section 3.1 of this Guideline should be considered in assessing sufficiency and in any plans to improve the facilities.

3.3 No Significant Landfill Gas

The regulations provide for the submission of a report, if appropriate, to show that gas facilities may not be needed.

Under Subsection 15(3) of O. Reg. 232/98 and Subsection 11.1(5) of Regulation 347, a landfill owner may submit a report to the Part V, EPA Director showing that the nature and quantity of landfill gas generated at a site is not likely to be of significant concern. If the report is acceptable, the Part V, EPA Director could determine whether landfill gas generated at a site is likely of significant concern and whether gas facilities are required.

The factors to be considered in this assessment are the characteristics of the site, the type of waste to be deposited and the rate at which waste is deposited at the site. The type of information required for such a report includes the following:

- A description and assessment of the available information on the types, composition, quantities and age of the waste that has been landfilled and that is expected to be landfilled for the remaining site life, including an assessment of the concentrations and quantities of landfill gas that is being and may be generated by these wastes.
- Representative measurements and an assessment of the characteristics of the landfilled waste, the concentrations of any landfill gas within the landfilled waste, and the concentrations and quantities of landfill gas being emitted at the surface of the landfilled waste.
- A description and assessment of the characteristics of the site including any design characteristics or operating procedures that may affect the concentrations and quantities of landfill gas that is being and may be generated by the waste.
- Modeling of landfill gas production using the Scholl Canyon model, or other model acceptable to the Director, to estimate gas concentrations, gas quantities and gas generation profile over the time period of generation. Modeling should be done based on site and waste specific conditions, and for comparison, based on site specific conditions and waste conditions typical of mixed municipal waste landfills. An assessment of the results of the modeling should be provided.

- An assessment of the practical ability to collect and use or flare the landfill gas, if any, being generated and expected to be generated in the future at the site.

The potential landfill gas concentrations to be considered in the report include methane (CH_4), carbon dioxide (CO_2), odour causing compounds such as hydrogen sulphide (H_2S), and non-methane organic compounds (NMOCs). Other compounds should also be assessed if considered appropriate for the site.

3.4 Sample Application

Sample application packages for approval of landfill gas collection and control facilities under Part V and Section 9 of the EPA are available on the Ministry website at:

PIBS 6836e (Part V)

<http://www.ene.gov.on.ca/envision/gp/6836e.pdf>

PIBS 6832e (Section 9)

<http://www.ene.gov.on.ca/envision/gp/6832e.pdf>

Further information on the sample application can be obtained by contacting the Environmental Assessment and Approvals Branch of the Ministry.

4.0 OTHER ENVIRONMENTAL APPROVALS

Proposals for new or expanding landfills and for the use of landfill gas to generate electricity may be subject to other environmental approvals, including approval under the *Environmental Assessment Act* (EAA).

This section of the Guideline provides a general description of the approval requirements under the EAA for landfills and landfill gas electricity projects.

The need for environmental assessment or any other environmental approval for a particular landfill or landfill gas proposal or project should be determined by contacting the Environmental Assessment and Approvals Branch of the Ministry.

4.1 EAA Approval

This section of the Guideline provides a general description of the approval requirements for landfills and landfill gas electricity projects.

Ontario Regulation 101/07 under the EAA sets out the EAA approvals process categories for waste management proposals, including landfills. Ontario Regulation 116/01 under the EAA sets out the EAA approvals process categories for electricity projects, including electricity projects using landfill gas as fuel.

4.1.1 Waste Management Projects Regulation

The Waste Management Projects regulation, Ontario Regulation 101/07, sets out the environmental assessment process categories for waste management proposals, including landfills. Waste management projects fall under one of three possible environmental assessment categories. For proposed new or expanding landfills, the three project categories apply as follows:

- **Individual Environmental Assessment:**
Landfills or landfill expansions larger than 100,000 cubic metres.
- **Environmental Screening Process:**
Landfills or landfill expansions between 40,000 and 100,000 cubic metres.
- **Exempt from EAA:**
Landfills or landfill expansions smaller than 40,000 cubic metres.

Proposed new landfills larger than 1.5 million cubic metres are subject to individual EA approval, as indicated above, and landfill gas facilities are required for the site under O. Reg. 232/98.

Proposed landfill expansions of 40,000 cubic metres or more up to 100,000 cubic metres are subject to the environmental screening process (ESP), and landfill expansions larger than 100,000 cubic metres are subject to individual environmental assessment, as indicated above. Where the proposed expansion increases the total site capacity to more than 1.5 million cubic metres, O. Reg. 232/98 results in landfill gas facilities being required for the site.

The landfill proponent in either case (ESP or individual EA) should indicate in the environmental assessment that landfill gas facilities are required under O. Reg. 232/98. A general description of the design and timing of implementing the gas facilities should also be included in the environmental assessment.

Reference should be made to the Ministry “Guide to Environmental Assessment Requirements for Waste Management Projects” dated March 15, 2007 for information on O. Reg. 101/07 and the applicable EAA requirements.

4.1.2 Electricity Projects Regulation

The Electricity Projects regulation, O. Reg. 116/01, sets out the EAA process categories for electricity projects, including electricity projects using landfill gas as fuel. Electricity projects fall under one of three possible EAA process categories. For landfill gas projects two project categories apply, as follows:

- **Environmental Screening Process:**
Landfill gas electricity projects generating ≥ 25 MW of electricity.
- **Exempt from EAA:**
Landfill gas electricity projects generating < 25 MW of electricity.

A proposed electricity project using landfill gas as fuel and generating ≥ 25 MW of electricity is subject to the Environmental Screening Process (ESP). This requirement applies independently of the size and regardless of the operational status of the landfill (i.e. operating or closed). Where the landfill is an operating landfill with a total site capacity larger than 1.5 million cubic metres, Regulation 347 results in landfill gas facilities for collection and flaring being required for the site.

Under Regulation 347, operation of the gas collection and flaring facilities would be required regardless of the ongoing viability of electricity generation. The electricity project proponent in this case should indicate in the environmental assessment that landfill gas facilities are required under Regulation 347. A general description of the design and timing of implementing the gas facilities should also be included in the environmental assessment.

Reference should be made to the Ministry “Guide to Environmental Assessment Requirements for Electricity Projects” dated March 2001 for information on O. Reg. 116/01 and the EAA Screening process requirements.

APPENDIX 1 – O. Reg. 232/98

The regulatory requirements applicable to proposed new or expanding landfills in Section 15 of O. Reg. 232/98 pursuant to the *Environmental Protection Act* are set out below. Section 11.4 of Regulation 347 which requires reporting of landfill greenhouse gas reductions also applies to new and expanding landfills (refer to Appendix 2).

ATMOSPHERIC EMISSIONS OF LANDFILL GAS

15. (1) A person shall not establish a new landfilling site or increase the total waste disposal volume of an existing landfilling site unless a written report has been prepared respecting the design, operation, maintenance and monitoring of facilities for the collection, and for the burning or use, of landfill gas generated by the site during site operation and following site closure.

(2) Subsection (1) applies only if a new landfilling site is being established with a total waste disposal volume of more than 1.5 million cubic metres or the total waste disposal volume of an existing landfilling site is being increased to more than 1.5 million cubic metres.

(3) Subsection (1) does not apply to a landfilling site if a written report is prepared showing that the nature and quantity of landfill gas generated at the site is not likely to be of significant concern to the Director, based on the following factors:

1. The characteristics of the site.
2. The type of waste to be deposited.
3. The rate at which waste is deposited at the site.

(3.1) Subsection (1) does not apply to a landfilling site if the only waste to be landfilled at the site is coal ash.

(4) Subsection (1) does not apply to a landfilling site associated with forest products operations, such as the operations of a lumber mill, sawmill, pulp mill or similar facility, if the waste to be deposited at the site is produced by the forest products operations and is predominantly solid, non-hazardous process waste, such as woodwaste, effluent treatment solids, hog fired boiler ash, recycling process rejects, lime mud, grits or dregs.

The description of the regulatory requirements in this Guideline is given for convenience only. Reference should be made to the current relevant legislation and regulations to determine the exact requirements.

APPENDIX 2 – Regulation 347

The regulatory requirements applicable to operating landfills in Sections 11.1 to 11.5 of Regulation 347 pursuant to the *Environmental Protection Act* are set out below. Section 11.4 which requires reporting of landfill greenhouse gas reductions also applies to new and expanding landfills (refer to Appendix 1).

11.1 (1) The owner and the operator of a landfilling site described in subsection (2) shall ensure that on or before June 30, 2009 a written report is submitted to the Section 39 Director respecting,

- (a) the design, operation, maintenance and monitoring of the facilities for the collection, and for the burning or use, of landfill gas generated by the site during site operation and following site closure; and
- (b) if any of the facilities referred to in clause (a) already exist, the improvements, if any, that can be made to those facilities to increase the amount of landfill gas generated by the site that can be collected, and burned or used, and the date by which the improvements can be made and implemented.

(2) This section applies to a landfilling site that meets the following criteria:

1. The site accepts only municipal waste for disposal.
2. On or after June 30, 2009, the site will landfill waste under a certificate of approval or provisional certificate of approval issued under Part V of the Act.
3. On or after June 30, 2009, the site will have a total waste disposal volume of more than 1.5 million cubic metres.
4. A written report has not been required to be prepared with respect to the site under subsection 15 (1) of Ontario Regulation 232/98 (Landfilling Sites) made under the Act.

(3) This section does not apply to a landfilling site associated with forest products operations, such as the operations of a lumber mill, sawmill, pulp mill or similar facility, if the waste deposited at the site is produced by the forest products operations and is predominantly solid, non-hazardous process waste, such as woodwaste, effluent treatment solids, hog fired boiler ash, recycling process rejects, lime mud, grits or dregs.

(4) This section does not apply to a landfilling site if the only waste landfilled at the site is coal ash.

(5) This section does not apply to a landfilling site if a written report is submitted to the Section 39 Director before June 30, 2009 showing that the nature and quantity of landfill gas generated by the site is not likely to be of significant concern to the Director, based on the following factors:

1. The characteristics of the site.
2. The type of waste to be deposited.
3. The rate at which waste is deposited at the site.

(6) This section does not apply to a landfilling site that meets the following criteria:

1. The site operates under a certificate of approval or provisional certificate of approval issued under Part V of the Act.
2. The certificate of approval or provisional certificate of approval permits the use of facilities for the collection, and for the burning or use, of landfill gas generated by the site during site operation but does not require that some or all of those facilities be used.
3. The site has in operation facilities that are not required by the certificate of approval or provisional certificate of approval for the collection, and for the burning or use, of landfill gas generated by the site during site operation.
4. The owner or the operator of the site gives the Section 39 Director a written notice that,
 - i. specifically mentions this subsection, and
 - ii. requests that this section not apply.

11.2 (1) If section 11.1 does not apply to a landfilling site because the criteria listed in subsection 11.1 (6) are met, the owner and the operator of the site shall ensure that, on or before June 30, 2009, a written report is submitted to the Section 39 Director,

- (a) identifying the areas of the site where facilities for the collection, and for the burning or use, of landfill gas generated by the site during site operation are in operation and for which there is no requirement under the certificate of approval or provisional certificate of approval under which the site operates;
- (b) describing the design and operation of the facilities for the collection, and for the burning or use, of landfill gas generated by the site during site operation and following site closure in the areas of the site that are identified in clause (a);

- (c) respecting the design, operation, maintenance and monitoring of the facilities for the collection, and for the burning or use, of landfill gas generated by the site during site operation and following site closure in the areas of the site that are not identified in clause (a); and
 - (d) if any of the facilities referred to in clause (c) already exist, respecting the improvements, if any, that can be made to those facilities to increase the amount of landfill gas generated by the site that can be collected, and burned or used, and the date by which the improvements can be made and implemented.
- (2) The owner and the operator of a landfilling site for which a written report must be submitted under subsection (1) shall ensure that, on or before June 30, 2016, a written report is submitted to the Section 39 Director respecting,
- (a) the design, operation, maintenance and monitoring of the facilities for the collection, and for the burning or use, of landfill gas generated by the site during site operation and following site closure; and
 - (b) if any of the facilities referred to in clause (a) already exist, the improvements, if any, that can be made to those facilities to increase the amount of landfill gas generated by the site that can be collected, and burned or used, and the date by which the improvements can be made and implemented.
- 11.3** (1) Subject to subsection (2), the owner and the operator of a landfilling site to which section 11.1 or 11.2 applies shall ensure that the following facilities and improvements to the facilities are in operation for the collection, and for the burning or use, of landfill gas generated by the site during site operation and following site closure:
1. If section 11.1 applies, the facilities referred to in clause 11.1 (1) (a) and any improvements identified under clause 11.1 (1) (b).
 2. If section 11.2 applies, the facilities referred to in clause 11.2 (1) (c) and any improvements identified under clause 11.2 (1) (d).
- (2) If, after receiving the report submitted under subsection 11.1 (1) or 11.2 (1), the Section 39 Director has required facilities other than the facilities referred to in subsection (1) as a condition of a certificate of approval or provisional certificate of approval, the owner and the operator shall ensure that the facilities required by the Director are in operation for the collection, and for the burning or use, of landfill gas generated by the site during site operation and following site closure.

(3) This section applies to a portion of a waste fill zone in a landfilling site to which section 11.1 applies or in an area of a landfilling site to which section 11.2 applies that is not identified in clause 11.2 (1) (a) if, at any time on or after December 31, 2010,

- (a) the portion of the zone has reached its maximum capacity; or
- (b) no further waste has been deposited in the portion of the zone during the preceding six months.

11.4 (1) The owner and the operator of a landfilling site described in subsection (4) shall ensure that for 2009 and every subsequent year, an annual report is submitted to the Director of the Environmental Monitoring and Reporting Branch of the Ministry on or before June 1 of the following year.

(2) The report required under subsection (1) shall be in writing and shall include the following with respect to the facilities for the collection, and for the burning or use, of landfill gas generated by the landfilling site during site operation and following site closure:

1. A statement of the total landfill gas volume collected by the facilities at the site during the year.
2. A statement of the percentage of the volume described in paragraph 1 that was methane gas.
3. A statement of the reduction in methane emissions from the landfilling site associated with the burning or use of landfill gas during the year, expressed in units of tonnes of carbon dioxide equivalent and based on a global warming potential of 21 for methane gas.
4. A description of how sound scientific or engineering principles have been used to support the statements required by paragraphs 1, 2 and 3.
5. All calculations and information that support the statements required by paragraphs 1, 2 and 3.

(3) The report required for 2009 under subsection (1) shall include the information described in subsection (2) only for the period that begins on June 30, 2009 and ends on December 31, 2009.

(4) This section applies to a landfilling site that meets the following criteria:

1. The site accepts only municipal waste for disposal.
2. On or after June 30, 2009, the site landfills waste under a certificate of approval or provisional certificate of approval issued under Part V of the Act.

3. On or after June 30, 2009, the site has a total waste disposal volume of more than 1.5 million cubic metres.

(5) This section does not apply to a landfilling site associated with forest products operations, such as the operations of a lumber mill, sawmill, pulp mill or similar facility, if the waste deposited at the site is produced by the forest products operations and is predominantly solid, non-hazardous process waste, such as woodwaste, effluent treatment solids, hog fired boiler ash, recycling process rejects, lime mud, grits or dregs.

(6) This section does not apply to a landfilling site if the only waste landfilled at the site is coal ash.

(7) This section does not apply to a landfilling site for which a written report has been submitted to the Section 39 Director under subsection 11.1 (5).

(8) This section ceases to apply to a landfilling site if the Section 39 Director amends a certificate of approval or provisional certificate of approval issued under Part V of the Act to state that the nature and quantity of landfill gas generated by the site is not of significant concern to the Director.

11.5 (1) On request of the Section 39 Director, the owner or the operator who is required to submit a report under section 11.1, 11.2 or 11.4 shall provide further information with respect to the subject matter of the report.

(2) The information requested under subsection (1) shall be provided to the Director who made the request by a date set by the Director at the time of the request.

The description of the regulatory requirements in this Guideline is given for convenience only. Reference should be made to the current relevant legislation and regulations to determine the exact requirements.